

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 1, 2018/2019

### DCT5038 – DATA COMMUNICATIONS AND NETWORKING (DIT & DBIS)

16 OCTOBER 2018  
2:30 p.m. – 4:30 p.m.  
(2 Hours)

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#### INSTRUCTIONS TO STUDENT:

1. This question paper consists of **THREE (3)** pages.
2. There are **FIVE (5)** structured questions in this paper. Each question carries total of **20 Marks**.
3. Answer **ALL** questions in the **Answer Booklet** provided.

**Structured Questions [100 marks]**

*Instruction: Write your answers in the Answer Booklet.*

**Question 1**

- a) Briefly explain what will happen if one of the cables is damaged in the following topology:

- i. Mesh
- ii. Ring

(2 marks)

- b) Based on the *Figure 1*, name the label A until C in OSI layer. Briefly describe its function and the type of address that being used of these layers.

|                    |
|--------------------|
| Application Layer  |
| Presentation Layer |
| Session Layer      |
| C                  |
| B                  |
| A                  |
| Physical Layer     |

*Figure 1*

(9 marks)

- c) A periodic signal is decomposed into five waves with frequencies of 150, 200, 240, 350 and 450Hz.

- i. Calculate the bandwidth of the signal.
- ii. Draw the frequency spectrum, assuming all components have maximum amplitude of 15V.

(6 marks)

- d) A document is sent out from a station with the length of 450 byte. Calculate its transmission time if the bandwidth of the network is 200 kbps. Write your answer in milliseconds (ms).

(3 marks)

**[TOTAL 20 MARKS]**

**Question 2**

- a) Draw a digital signal of a data stream 00101101 with the encoding schemes below:

- i. Manchester
- ii. AMI

(8 marks)

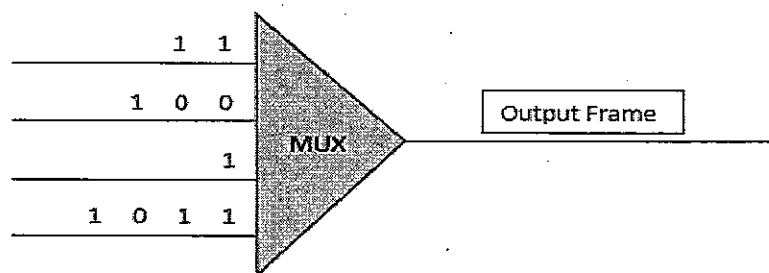
**Continued...**

- b) A signal has a sampling rate of 15,000 sample/s. Calculate its bit rate if there are 8 bits per sample. (2 marks)
- c) Draw the constellation diagram for the following cases. Determine the phase for each case and define the type of modulation (ASK, FSK, PSK or QAM).
- The data points at (2, 0) and (-2, 0) (4 marks)
  - The data points at (5, 0), (-5, 0), (5, 5) and (-5, -5) (4 marks)
- d) List **TWO** types of analog-to-analog conversion. (2 marks)

[TOTAL 20 MARKS]

### Question 3

- a) Six channels, each with a  $2 \times 10^5$  Hz bandwidth, are to be multiplexed together. If there is a need for a guard band of 20 kHz between the channels to prevent interference, what is the minimum bandwidth of the link? Write your answer in kHz. (3 marks)
- b) **Figure 2** shows TDM. Assume data rate for each input connection is 25kbps and 1 bit is taken from each input with no synchronizing bits, answer the following questions.
- Calculate the size of an output frame in bits. (2 marks)
  - Draw the output data stream. (2 marks)
  - Calculate output frame rate. (2 marks)
  - Calculate output data rate. (2 marks)



**Figure 2**

- c) Briefly explain the way of light travels in fiber-optic cable. Draw the diagram to show how it works. (5 marks)
- d) State **FOUR** characteristics of infrared wireless transmission (4 marks)

[TOTAL 20 MARKS]

Continued...

**Question 4**

- a) A sender sends a block of information bits as follow:

**11000011 10101101 00110010 11010110**

Assume two dimensional parity check is used, show the complete block of information that will be received by the receiver.

(6 marks)

- b) Given a bit stream of 01011001 00101111, identify the checksum that will be send by the sender.

(3 marks)

- c) List **TWO** main methods that used for error correction.

(2 marks)

- d) Draw the Stop-and-Wait ARQ diagram to illustrate the situation when the acknowledgement is lost.

(4 marks)

- e) Define High-level data link control (HDLC) and state **THREE** characteristic for Asynchronous Balanced Mode (ABM) in HDLC.

(5 marks)

**[TOTAL 20 MARKS]**

**Question 5**

- a) Briefly explain how Carrier Sense Multiple Access (CSMA) p-persistent strategy works and list **TWO** advantages of this strategy.

(5 marks)

- b) Briefly explain **TWO** types of network that defined by Bluetooth.

(4 marks)

- c) Differentiate between hub and bridge.

(6 marks)

- d) Briefly describe Virtual Circuit Identifier (VCI). Draw a diagram of VCI to show when a frame arrived and leave at a switch.

(5 marks)

**[TOTAL 20 MARKS]**

**End of Page.**

